RESTORATIVE MATERIAL CHOICES FOR MANAGING DEVELOPMENTAL DENTAL DEFECTS

Hazel O. Simila
Lecturer: UoN Dental School
Introduction

Managing developmental dental defects may not be a walk in the park:

- Variations
- Material options
- Lengthy & costly
Outline

– What are developmental dental defects
– Highlight key materials applied in restorative dentistry
– Challenges associated with the restorative work specifically in DDDs
– Some proposals for addressing those challenges
– How we can contribute to the evidence basis for management of DDDs?
What are they?

– Abnormal dental tissues (enamel, dentine, cementum), arising from compromised developmental pathways which may be influenced by both genetic and/or environmental factors

– Size/Number/Shape

– STRUCTURE
Aim of Restorative Intervention

THE PROBLEM:
abnormal color, altered enamel texture, dental caries, dental hypersensitivity, reduction of the vertical dimension

- Prevent further deterioration
- Manage sensitivity
- Restore function
- Restore aesthetics
- Early intervention is key
Prevention modalities

- Sodium fluoride
- Calcium-phosphate rich agents e.g. CPP-ACP
- Desensitizing toothpastes
Restorative Material Considerations

- Age of Patient
- Socioeconomic factors
- Type/Severity

Outcome
Restorative Material Considerations

Materials fail

- Nature of material retention: TRBAs? Chemical? Mechanical?
- Structural strength of enamel/dentine - recurrent fracture and marginal leakage
- Integrity of etched enamel
- Failure and reparability: Adhesive vs cohesive failure
Resin Based: Composite+

- PROS
  - Aesthetic
  - Better mechanical properties - durability thus longevity
  - Better function

- CONS
  - Technique sensitivity
  - Compromised bond to poorly quality enamel
  - Polymerization shrinkage and stress
Resin Based: Composite+

- No special considerations in hypoplastic A.I
- Higher protein/less mineral content in hypomineralized defects
- Acid resistant fluoroapatite
- Hypocalcified/hypomaturation A.I presents insufficient enamel for bonding that fractures easily
- Predominant bonding to dentine**

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**Note:** The asterisks (*** and **) are not specified in the text and are likely placeholders for future notes or annotations.
Strategies to Enhance Resin Composite Outcomes in 3Ds

- Remove any softened enamel
- Pretreatment with 5% sodium hypochlorite = bond strength (Venezier et al., 2014)
- Removal of outermost hypermineralized layer in fluorosis
- Double/triple etch times in mod-severe fluorosis? Risk of insoluble deposits?
- Bleach stained substructure
- Opaquers are your best friend
- Etch & rinse>self etch, no rinse TRBAs
Ionomer Based: GIC & RMGIC

- **PROS**
  - Reduced moisture sensitivity and solubility
  - Fluoride release
  - Easier and more dependable adhesion in difficult conditions than the composite resins
  - ART functionality

- **CONS**
  - Inadequate mechanical properties*
Ionomer Based: GIC & RMGIC

- ‘RMGI is recommended in occlusal non-stress bearing areas’
- ‘No evidence exists in support of GIC so far’
Ionomer Based: GIC & RMGIC

– Can GIC be optimized?

"Operative Dentistry, 2015, 40-2, 134-143

Four-year Randomized Clinical Trial to Evaluate the Clinical Performance of a Glass Ionomer Restorative System

S Gurgan • ZB Kutuk • E Ergin
SS Oztas • FY Cekir

Clinical Relevance
The clinical effectiveness of Equin and Gradia Direct Posterior was acceptable in Class 1 and Class 2 cavities subsequent to four-year evaluation."
GIC & RMGIC – Composite Sandwich

– Rada and Hasiakos:

‘GIC and TRBAs as the first layer, with a composite restoration on top, in the treatment of AI. Hypothesized that chemical binding might improve the durability of the restoration’
Amalgam

- Pros and Cons are well known
- Mercury and global amalgam phasedown
- Inadequacy of creation of retentive features
- Indicated for small lesions in posterior teeth especially with mildly affected hypoplastic Al.
- Cl’d in severely affected teeth with Al.
Stainless Steel Crowns

Cons
• Minimal tooth reduction
• Full coverage
• Durable
• Affordable,
• Not technique sensitive

Pros
– Marginal adaptability
– Unaesthetic**
Polycarbonate Crowns

- Low cost
- Aesthetic
- Excellent alternative to direct resin restorations
- Durability
- Placement technique
Ceramic Crowns

Pros
- Aesthetic
- Ideal margin placement
- Less tooth reduction***
- Durable

Case report- Gokge et al., 2007

CONS
- Cost
- Technique/skill sensitivity
- Longevity studies lack
- Wear of opposing teeth
- Adhesion to underlying enamel
Metallo-ceramic Restorations

- Pros
  - Durability
  - Affordability
  - Combined strength+ aesthetics*
  - Excellent fit

- Cons
  - Subgingival margins
  - Metal free dentistry era
  - Significant tooth reduction

Case report (Turagam and Mudrakola, 2015)

Figure 1: Frontal view.

https://clinicaltrials.gov/ct2/show/NCT03735069
Conclusion

- Insufficient support to provide high quality evidence to establish guidelines for clinical practice.
- For studies attempted, samples were not representative of the population of children with DDDs.
- Mainly case reports and descriptive studies: risk of bias, therefore invalid.
- Questions related to longevity remain unanswered.
- Calls for PEARL.
- Bridge the gap between clinical outcomes and material R&D.
References